



**BIOLOGY
HIGHER LEVEL
PAPER 1**

Thursday 4 May 2006 (afternoon)

1 hour

INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Answer all the questions.
- For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.

1. If a cell plate is beginning to form and nuclei are re-forming at opposite ends of a cell, what kind of cell is this?
 - A. An animal cell in prophase
 - B. A plant cell in prophase
 - C. An animal cell in telophase
 - D. A plant cell in telophase

2. The width of a human hair is 0.1 mm. What is the width in μm ?
 - A. 10 μm
 - B. 100 μm
 - C. 1000 μm
 - D. 10 000 μm

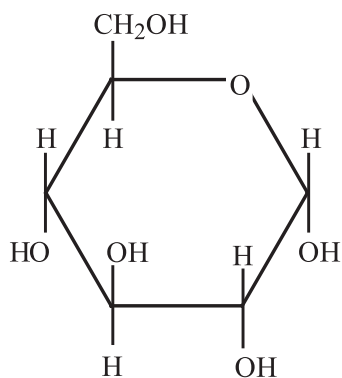
3. What process involves the movement of solvent through a semi-permeable membrane from a region of low solute concentration to a region of high solute concentration?
 - A. Active transport
 - B. Osmosis
 - C. Simple diffusion
 - D. Facilitated diffusion

4. Which of the following is an organic compound found in both plant and animal cells?
 - A. Cellulose
 - B. Carbonate
 - C. Water
 - D. Pyruvate

5. Which of the following features are correct for hydrogen bonding?

- I. It is involved in the cohesion of water.
 - II. It results in the thermal properties of water.
 - III. It is a bond within the water molecule.
- A. I and II only
 - B. II and III only
 - C. I and III only
 - D. I, II and III

6.



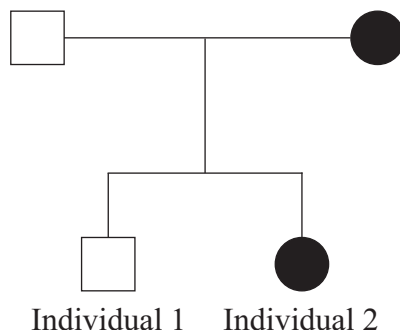
Which of the following terms correctly describe(s) the molecule above?

- I. Monosaccharide
 - II. Glucose
 - III. Component of triglyceride
- A. I only
 - B. I and II only
 - C. II and III only
 - D. I, II and III

7. What is a role of carbohydrates in animal cells?
- A. As channels for passive transport
 - B. As enzymes
 - C. As energy storage
 - D. As components of the animal cell wall
8. Which property of water is most important to plants living below the surface of water?
- A. Cohesion
 - B. Oxygen solubility
 - C. Surface tension
 - D. Transparency

The following information refers to questions 9 and 10.

Hypophosphataemia is a disorder involving poor re-absorption of phosphate from glomerular filtrate in humans. It shows a sex-linked dominant pattern of inheritance as illustrated in the following pedigree.



Key:

□ = unaffected male ● = affected female

9. Which row in the table identifies the genotypes of individuals 1 and 2?

	Individual 1	Individual 2
A.	$X^H X^h$	$X^H Y$
B.	$X^h Y$	$X^H X^H$
C.	$X^h Y$	$X^H X^h$
D.	unaffected	affected

10. Which characteristic could be used to diagnose hypophosphataemia?

- A. Low levels of phosphate in the blood
- B. Low levels of phosphate in the urine
- C. Raised levels of phosphate in the filtrate leaving the Bowman's capsule
- D. Higher levels of ADH in the blood

- 11.** What is the genetic cross called between an individual of unknown genotype and an individual who is homozygous recessive for a particular trait?
- A. Test-cross
 - B. Hybrid cross
 - C. Dihybrid cross
 - D. F_1 cross
- 12.** What is the usual cause of Down's syndrome?
- A. 21 pairs of chromosomes
 - B. Trisomy 21
 - C. Non-disjunction of sex chromosomes
 - D. Fertilization of the egg by two sperm
- 13.** Which of the following conditions has been treated by gene therapy?
- A. Emphysema
 - B. SCID
 - C. Coronary heart disease
 - D. Colon cancer
- 14.** Which enzyme is used to produce complementary DNA (cDNA) from mRNA?
- A. Restriction endonuclease
 - B. Reverse transcriptase
 - C. DNA ligase
 - D. RNA primase

15. Why is it possible for a gene from one organism to be introduced and function in a different organism?
- A. All organisms are made of cells.
 - B. All organisms have nuclei.
 - C. The genetic code is universal.
 - D. All organisms have ribosomes.
16. Natural selection is based on which of the following?
- I. Variation exists within populations.
 - II. There is differential reproductive success within populations.
 - III. Individuals must adapt to their environment.
- A. I only
 - B. I and II only
 - C. II and III only
 - D. I, II and III
17. For the following 10 measurements 4,5,5,6,6,6,6,7,7,8 the mean value is 6. What is the best estimate of the standard deviation?
- A. 8
 - B. 6
 - C. 3
 - D. 1

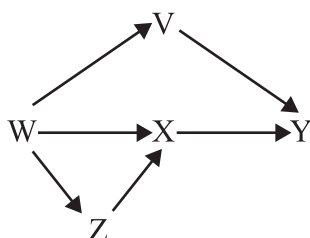
18. Which of the following represents a kingdom?

- A. Eukaryote
- B. Viruses
- C. Protocista
- D. Mammals

19. Which of the following statements describe a “population”?

- A. All the autotrophs and heterotrophs living in a certain area
- B. Individuals belonging to the same species in a certain area
- C. Two geographically isolated groups belonging to the same species
- D. A group of different species living in the same area at the same time

20. The diagram below is a food web and each letter represents a species.



Which is the best prediction about biomass?

- A. The biomass of X is more than the biomass of W.
- B. The biomass of X is less than the biomass of Y.
- C. The biomass of V + X + Z is equal to the biomass of W.
- D. The biomass of Y is less than the biomass of Z.

21. Which of the following changes occur with the onset of exercise?
- A. Increase in pH of blood
 - B. Increase in rate of cellular respiration
 - C. Decrease in rate of contraction of the diaphragm
 - D. Decrease in carbon dioxide concentration of the blood
22. In which part of the digestive system is most water re-absorbed?
- A. The kidneys
 - B. The stomach
 - C. The small intestine
 - D. The large intestine
23. Which of the following is part of the process of ventilation?
- A. Changes in the volume of the thoracic cavity
 - B. Exchange of gases across the surface of the alveoli
 - C. Exchange of gases across the surface of capillaries
 - D. Cellular respiration
24. Which of the following occur(s) at birth in the mother's body?
- I. Increase in oxytocin
 - II. Increase in uterine contractions
 - III. Increase in levels of progesterone
- A. I only
 - B. I and II only
 - C. II and III only
 - D. I, II and III

- 25.** Which of the following is regulated by positive feedback?
- A. Blood sugar
 - B. Temperature
 - C. Oxytocin levels
 - D. Progesterone levels
- 26.** Which of the following is a secondary sexual characteristic in human females?
- A. Increasing relative width of hips
 - B. Presence of mammary glands
 - C. Presence of a uterus
 - D. Presence of a bladder
- 27.** According to the induced fit model of enzyme function, which of the following statements is correct?
- A. Active sites on enzymes are specific to a single substrate.
 - B. The shape of the active site can be changed by the binding of an allosteric inhibitor.
 - C. The binding of the substrate changes the shape of the active site slightly.
 - D. Competitive inhibitors can change the shape of enzymes.
- 28.** Which of the following statements about pyruvate is true?
- A. It contains less energy than glucose per molecule.
 - B. Every molecule of glucose is converted to one molecule of pyruvate.
 - C. Pyruvate is produced in the mitochondria.
 - D. Under aerobic conditions, pyruvate is converted to lactate.

- 29.** At which stage of photosynthesis is light involved most directly?
- A. Reduction of NADP^+ to NADPH_2
 - B. Chemiosmosis
 - C. The synthesis of chlorophyll
 - D. The photoactivation of chlorophyll
- 30.** During which process are oxygen molecules directly involved during cellular respiration?
- A. Glycolysis
 - B. Krebs cycle
 - C. Oxidation of pyruvate to acetyl CoA
 - D. Accepting electrons at the end of the electron transport chain
- 31.** Which of the following is/are necessary to produce monoclonal antibodies?
- I. Tumour cells
 - II. Plasma (B) cells
 - III. Macrophages
- A. II only
 - B. I and II only
 - C. II and III only
 - D. I, II and III
- 32.** In which of the following structures does meiosis take place?
- A. Epididymis
 - B. Prostate gland
 - C. Testis
 - D. Seminal vesicle

33. Membrane proteins are critical components of nerve function.

Which process in nerves does **not** require a membrane protein?

- A. Diffusion of neurotransmitter
- B. Active transport of sodium
- C. Propagation of an action potential
- D. Binding of neurotransmitter

34. Which of the following has vascular tissue?

- A. Algae
- B. Chlorophyta
- C. Bryophyta
- D. Angiospermophytes

35. What treatment is most likely to lead to germination?

- A. Soaking the seeds in a solution of gibberellins
- B. Increasing CO₂ concentration
- C. Increasing light intensity
- D. Dehydrating the seeds

36. Which of the following explains clonal selection?

- A. Memory cells are present at birth.
- B. Antigens activate specific immune responses.
- C. The body selects which antigens it will respond to.
- D. People with similar genes respond to antigens in a similar way.

37. Where is an anti-codon located?
- A. tRNA
 - B. mRNA
 - C. DNA
 - D. Ribosomes
38. Which human trait shows a pattern of polygenic inheritance?
- A. ABO blood type
 - B. Sickle cell anemia
 - C. Skin colour
 - D. Co-dominant alleles
39. All seven of the characteristics of pea plants studied by Mendel displayed independent assortment. What does this necessarily indicate?
- A. The seven different pairs of alleles were on the same chromosome.
 - B. The seven different pairs of alleles behaved as if they were on different chromosomes.
 - C. Each parent had two alleles for each trait, but gave only one to the progeny.
 - D. All seven pairs of alleles were on a single set of homologous chromosomes.
40. If the haploid number of an organism is 8, how many different varieties of gametes are possible, not considering the effects of crossing over?
- A. 16
 - B. 64
 - C. 128
 - D. 256
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